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- (71) Applicant (for all designated States except US): DSM IP ASSETS B.V. [NL/NL]; Het Overloon 1, NL-64111 TE Heerlen (NL).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): PEL, Herman, Jan [NL/NL]; Eikenstraat 75, NL-1326 AH Almere (NL). HOPPER, Sylvia [DE/DE]; Lochhamer Str. 11, 82152 Martinsried (DE).
- (74) Agents: WRIGHT, Simon, Mark et al.; J.A. Kemp & Co, 14 South Square, Gray's Inn, London WC1R 5JJ (GB).
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(54) Title: GENES FROM PROPIONIBACTERIUM FREUDENREICHII ENCODING ENZYMES INVOLVED IN VITAMIN B12 BIOSYNTHESIS

(57) Abstract: Four new genes, and the enzymes that they encode, are disclosed, which are present in *Propionibacterium freudenreichii*, and which are involved in at least five steps in the biosynthetic pathway of vitamin B₁₂. The four enzymes are: A: cobyrinic acid a, c-diamide synthase; B: a bifunctional enzyme, which is a cobinamide kinase and a cobinamide phosphate guanyl transferase; C: a cobalamin 5-phosphate synthase; and D: an adenosyl transferase. Genes encoding the four enzymes can be placed in *Propionibacteria* shuttle vectors and used to transform *Propionibacteria* hosts, in order to improve the production of vitamin B₁₂ or a precursor thereof on an industrial scale during fermentation.

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